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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/716,278

11/18/2003

Nace Layadi

LAYADI 36-39

6063

47396

7590

11/04/2005

HITT GAINES, PC  
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EXAMINER

WILSON, CHRISTIAN D

ART UNIT

PAPER NUMBER

2891

DATE MAILED: 11/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/716,278

Applicant(s)

LAYADI ET AL.

Examiner

Christian Wilson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 August 2005.  
2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-18 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 18 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1 – 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The addition to claim 1 and 10 of the limitation “photoresist” is new matter since it was not described in the application at the time of filing.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Witek *et al.* in view of Gopalan *et al.*

Regarding claim 1, Witek *et al.* (US 6,146,970) teaches a method of manufacturing a trench isolation structure comprising the steps of forming a polysilicon hardmask 206 over a

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substrate **202**, forming a photoresist layer **208**, forming an opening in the hardmask with the photoresist [Figure 6], etching a trench **210** in the substrate, and filling the trench with an insulative material **216a**. Witek *et al.* does not discuss removing the photoresist before etching the trench. Gopalan *et al.* (US 6,794,269) teaches removing the photoresist before etching the trench in the substrate [column 8, lines 1-15]. It would have been obvious to one of ordinary skill in the art to remove the photoresist in Witek *et al.* before forming the trench since Gopalan *et al.* teaches that a two step etching process with removal before etching steps provides more etch selectivity to substrate than the hardmask layer.

Regarding claims 2 and 3, Witek *et al.* further teaches a pad oxide **204** with a thickness of 5 to 25 nm [column 6, line 16].

Regarding claims 4 and 5, Witek *et al.* further teaches a liner oxide **212** with a thickness of 10 to 50 nm [column 7, line 6].

Regarding claim 6, Witek *et al.* further teaches depositing the insulative material within the trench [Figure 8].

Regarding claim 7, Witek *et al.* further teaches a polysilicon hardmask with a thickness of 80 to 200 nm [column 6, line 22].

Regarding claim 9, Witek *et al.* further teaches a trench isolation structure [Figure 9].

Regarding claim 10, Witek *et al.* teaches a method of manufacturing a trench isolation structure comprising the steps of forming a polysilicon hardmask **206** over a substrate **202**, forming a photoresist layer **208**, forming an opening in the hardmask with the photoresist [Figure 6], etching a trench **210** in the substrate, filling the trench with an insulative material **216a**, forming transistor devices **230** over the substrate, and constructing an interlevel dielectric layer

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**262** over the devices and having interconnects contacting the devices [column 2, lines 20-25].

Witek *et al.* does not discuss removing the photoresist before etching the trench. Gopalan *et al.* teaches removing the photoresist before etching the trench in the substrate [column 8, lines 1-15]. It would have been obvious to one of ordinary skill in the art to remove the photoresist in Witek *et al.* before forming the trench since Gopalan *et al.* teaches that a two step etching process with removal before etching steps provides more etch selectivity to substrate than the hardmask layer.

Regarding claims 11 and 12, Witek *et al.* further teaches a pad oxide **204** with a thickness of 5 to 25 nm [column 6, line 16].

Regarding claims 13 and 14, Witek *et al.* further teaches a liner oxide **212** with a thickness of 10 to 50 nm [column 7, line 6].

Regarding claim 15, Witek *et al.* further teaches depositing the insulative material within the trench [Figure 8].

Regarding claim 16, Witek *et al.* further teaches a polysilicon hardmask with a thickness of 80 to 200 nm [column 6, line 22].

Regarding claim 18, Witek *et al.* further teaches a trench isolation structure [Figure 9].

Regarding claims 8 and 17, Witek *et al.* teaches a trench with a depth of 0.3 to 0.7  $\mu\text{m}$  [column 6, line 50], but does not discuss the width of the trenches. Gopalan *et al.* teaches a trench width of 1 to 5  $\mu\text{m}$  [column 7, line 42]. It would have been obvious to one of ordinary skill in the art to use the trench widths of Gopalan *et al.* in the method of Witek *et al.* since these widths provide reduced substrate capacitance of the circuit devices.

***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian Wilson whose telephone number is (571) 272-1886. The examiner can normally be reached on weekdays, 7:30 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'CW', is positioned above the printed name of the examiner.

Christian Wilson, Ph.D.  
Primary Examiner  
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